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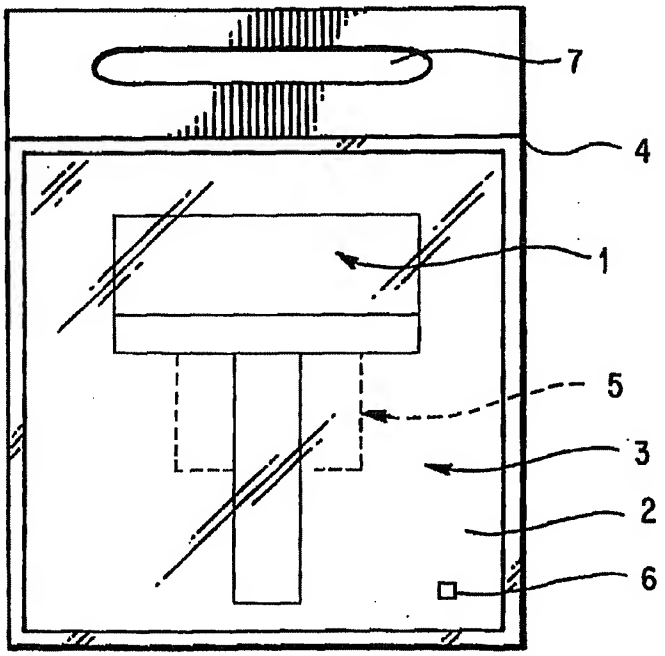
(54) Title: BLISTER-TYPE PACKAGE

(57) Abstract

A blister-type package includes one or more items (1) sandwiched between a backing (2) and a thermoplastic film (3) which is sealed to the backing along a closed line (4), external to the item(s) to be packaged. The thermoplastic film is mono- or bi-axially oriented when applied to the backing and, after application thereto, is heat shrunk so as to be tensioned over the item(s) and secures the item(s) to the backing. A method of making such a package also is disclosed.



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BLISTER-TYPE PACKAGE

BACKGROUND INFORMATION

1. Field of the Invention

The present invention relates to a blister-type package for the packaging of loose items such as might be sold at retail rack displays.

2. Background of the Invention

In the packaging of retail products other than food, the principal functions of a package are to contain the product (and possibly to compile many small products in the same package), to protect the packaged item(s) from dust and dirt, and to display the product(s) in a way that enhances sales appeal. An increasingly important feature is the ability of the package to be hung because hanging racks have been widely adopted as the most convenient and space efficient way to display small items.

Presently, loose items can be packaged in one of two primary forms: the so-called blister package or the so-called skin package.

A blister package consists of a stiff, usually clear, thermoformed plastic box, shaped to more or less fit the contours of the articles to be packaged which is lidded with a sheet of plastic or coated paperboard that carries the graphics and which can be perforated for rack-hung display. The package has an appealing appearance, but the packaging system lacks flexibility. Whenever the shape or the size of the item to be packaged is changed, the thermoformed plastic box where the item is loaded must be changed. Furthermore, the amount of plastic waste generated is very high because the thermoformed sheet generally has a thickness of from about 0.1 to about 1 mm.

Like the blister package, a skin package normally uses printed paperboard as one component. However, the other component of the package is made from a plastic film that is drawn down by vacuum around the product to be packaged until the film conforms so faithfully to the product contours that it becomes like a skin. This skin film holds the product in place on the paperboard and protects it from contaminants such as, for example, dust and dirt. In skin packages, the

product typically is positioned on a printed, plastic coated card which then moves onto a platen that contains air passages connected to a vacuum system. Plastic film is held in a frame above the product-carrying card. While in the frame, the film is heated for softening and then lowered over the product and onto the card. A vacuum is applied to bring the film into intimate contact with the product and coated card. Residual heat in the plastic film creates a heat seal with the coated card.

In skin and vacuum skin packaging, the skin top film is softened, optionally stretched, and drawn down to conform to the shape of the product to be packaged. Because the film thins during the skin packaging process, thick films generally are necessary to avoid package breakage.

That which has not been described previously is a blister-type package that requires a small amount of plastic material, that can be used for the packaging of product(s) of different shapes and sizes without requiring major modifications in the overall packaging process, and that can be easily and efficiently recycled after use. Provision of such a package remains desirable.

SUMMARY OF THE INVENTION

Briefly, the present invention provides a blister-type package that includes one or more products sandwiched between a backing and a thermoplastic film. The film covers the product(s) and is sealed to the backing along a line external to and spaced from the product(s). The film is mono- or bi-axially oriented when applied to the backing and, thereafter, is heat shrunk. Unlike films in skin packages, the film used in the blister-type package of the present invention does not completely shrink around the product(s); instead, the film encapsulates the product(s) by forming a blister-like cavity around it/them. The film is tensioned over the product(s) and secures it/them to the backing.

In another aspect, the present invention provides a method of making a blister-type package. The method includes loading one or more items on a backing, sealing a mono- or bi-axially oriented thermoplastic film to the backing so as to form a package precursor, and heating the package precursor so as to

shrink the thermoplastic film to at least a point where the thermoplastic film is tensioned over the item(s) and holds it/them to the backing. The thermoplastic film is sealed to the backing along a line external to and spaced from the item(s). Thus, the resulting package is a blister-type package as opposed to a skin package.

Advantageously, the blister-type package of the present invention has an appealing appearance and requires only a small amount of plastic material. If desired, the package of the present invention can be used in conjunction with standard retail hanging displays. Also, the package of the present invention advantageously can be used for the packaging of product(s) of different shape(s) and size(s) without requiring major modifications in the overall packaging process. Furthermore, the package of the present invention can include paperboard and plastic materials which, beneficially, can be separated easily from each other in a manner that allows for recycling of each.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. **1** is a plan view showing one embodiment of a package according to the present invention.

FIG. **2** is a side view of the package shown in FIG. **1**.

FIG. **3** is a plan view showing another embodiment of a package according to the present invention.

FIG. **4** is a bottom view of the package shown in FIG. **3**.

FIG. **5** is a side view showing still another embodiment of a package according to the present invention.

DETAILED DESCRIPTION OF ILLUSTRATIVE EMBODIMENTS

FIGs. **1** (plan view) and **2** (side view) show package 10, which represents an embodiment of the package of the present invention in which a single item 11 sits on backing 12. Backing 12 preferably is substantially planar (i.e., flat) and can be printed, if desired. Where rigid paperboard is used as backing 12, the thickness thereof can range from about 0.75 to about 3.75 mm (i.e., about 30 to about 150

mils), typically from about 1.25 to about 3.0 mm (i.e., about 50 to about 120 mils), and preferably from 1.5 to about 2.25 mm (i.e., about 60 to about 90 mils).

Alternatively, backing 12 can be a rigid or semi-rigid sheet of thermoplastic material. Mono- or multi-layer sheets can be used and can include one or more layers made from, for example, polyethylene terephthalate, polyvinyl chloride, polypropylene, polystyrene, and the like. Such a backing can be printed, trap-printed, or laminated to a paper label bearing graphics. Its thickness typically ranges from about 0.2 to about 1.25 mm (i.e., about 8 to about 50 mils) and preferably from about 0.3 to about 1.0 mm (i.e., about 12 to about 40 mils).

A sheet of a foamed polymer such as, for example, foamed polystyrene, foamed polyethylene terephthalate, or foamed polypropylene, also can be used as backing 12. The thickness of such a sheet can be greater than those indicated previously; for example, thicknesses of about 2.5 mm (i.e., about 100 mils) or even greater are possible.

Regardless of the type of material used, backing 12 can be coated with a heat-sealable polymer. Polymers particularly suitable for this purpose include ethylene homo- or co-polymers such as, for instance, low density polyethylene (LDPE); homogenous or heterogeneous ethylene/α-olefin copolymers (e.g., linear low density polyethylene or "LLDPE", linear medium density polyethylene or "LMDPE", very low density polyethylene or "VLDPE", etc.); ethylene/vinyl acetate copolymer (EVA); and the like.

Where a non-perforated heat-shrinkable film is used as thermoplastic film 13, backing 12 preferably contains at least one venting hole 16 that is not blocked by the item to be packaged. Venting hole 16 allows excess air within package 10 to escape during the shrinking step (described *infra*), thus avoiding ballooning of the package. (Where thermoplastic film 13 must shrink only minimally to be sufficiently tensioned over product 11, a venting hole is not absolutely necessary.) The shape of venting hole 16 is not critical. Round, elliptical, or semi-circular holes, and even slits, can be used. The size thereof should be sufficient to allow for the passage of air forced from package 10 during the heat-shrinking step. Where venting hole 16 is large, it can be closed after heat-shrinking of

thermoplastic film 13, if desired, to prevent dust and dirt from entering package 10 and possibly contaminating product 11.

Where a perforated film is used as thermoplastic film 13, venting hole 16 need not be present in backing 12. The pattern of perforations in such a film is not critical provided it does not compromise the mechanical properties of the film. Generally, a few holes of up to 500 μm of average diameter are sufficient to allow excess air to escape during the shrinking step without negatively affecting the film properties. Perforations in a film can be created by any method which provides holes of the desired average diameter. Laser and electric discharge can be employed to microperforate with holes of an average diameter up to about 150 μm. Flame or needle perforation can be used conveniently where holes of a larger average diameter are desired. Such techniques can be employed at any time prior to the shrinking step. If desired, such perforations can later be closed by, for example, application of an adhesive label.

In package 10, backing 12 has perforations 15 that create a pattern of weakness in backing 12. When the portion of backing 12 defined by perforations 15 is removed, product 11 can be accessed more easily. Although not shown in FIGs. **1** and **2**, the venting hole can be located in the line of perforations and be of a size that allows the ingress of a fingertip to grip the portion of the back delimited by the perforations. By tearing along the perforations, the defined portion can be removed and the package opened more easily.

Backing 12 also can include shaped hole 17 which allows package 10 to be hung in conjunction with standard retail displays. In package 10, thermoplastic film 13 advantageously is sealed to backing 12 only in the portion thereof that does not include shaped hole 17.

Perforations 15, venting hole 16, and shaped hole 17 can be produced according to conventional means known in the art, the choice of which depends primarily on the material selected for backing 12.

Thermoplastic film 13 is sealed to backing 12 along seal line 14 which is on the same side of backing 12 as product 11. Thermoplastic film 13 can be joined to backing 12 by means of a hot melt or spreadable pressure sensitive

adhesive distributed on backing 12 in an uninterrupted manner along seal line 14 by any conventional means. Use of an adhesive allows for the use of uncoated paperboard as backing 12 and for the easy separation thereof from thermoplastic film 13 (once the blister-type package is opened). This allows for the separate recycling of the two materials when the packaging material components of package 10 are to be discarded.

After application of the adhesive, thermoplastic film 13 is lowered over the product/paperboard and joined to the backing by pressing the two materials against each other along seal line 14, which is external to and spaced from the items to be packaged. A suitable pressing frame can be employed for this purpose.

Where paperboard coated with a heat-sealable polymer is used as backing 12, thermoplastic film 13 can be sealed thereto by any conventional technique such as, for example, impulse sealing, hot bar sealing, RF-sealing, ultrasonic sealing, etc., useful with the particular type of thermoplastic material(s) used. One preferred technique is impulse sealing. The advantage of the impulse sealing is that it can be used for almost any type of thermoplastic material. In this type of sealing, a sealing wire on a sealing frame of the desired shape receives an electric impulse of a suitable intensity and duration that heats it to the selected sealing temperature while the sealing frame is lowered on the conveyor pressing the surface of the front blister film to that of the backing along a closed line external to the items to be packaged. The sealing frame then is cooled and raised.

The shape of the sealing frame is not critical provided it encompasses the item(s) to be packaged. However, use of a sealing frame with a shape that essentially corresponds to that of the backing (or at least to the portion that does not contain shaped hole 17) can prove beneficial. As shown in FIG. 1, when such a frame is used, thermoplastic film 13 can be sealed near the edges of backing 12 or the portion thereof that does not contain shaped hole 17. Such a sealing frame can be used for packaging items of widely differing shapes and sizes.

Excess film, if any, can be cut either simultaneous to the sealing step or in a later step. Such cutting can be accomplished by any of a variety of suitable blades and/or knives.

Once thermoplastic film 13 has been sealed to backing 12 and any excess film has been removed, package 10 can be submitted to heat treatment while still being held horizontally. Heat treatment allows thermoplastic film 13 to shrink and affords the desired blister-type package. (A further description of the shrinking process is provided *infra*.)

FIGs. **3** (plan view) and **4** (bottom view) show package 20 in which single item 21 sits on backing 22. Backing 22 includes perforations 25 and shaped hole 27; however, backing 22 does not include a separate venting hole (as did package 10 from FIGs. **1** and **2**). In package 20, shaped hole 27 acts to vent air from the package during the heat shrinking process.

Thermoplastic film 23 extends over the entire top surface of backing 22 and is sealed on the bottom surface thereof (shown in FIG. **4**). Thermoplastic film 23 is sealed near the edges of backing 22, resulting in some excess film beyond seal line 24.

The same materials mentioned previously in conjunction with package 10 can be used in the manufacture of thermoplastic film 23 and backing 22 of package 20. Additionally, thermoplastic film 23 can be sealed to backing 22 using the same techniques described previously.

FIG. **5** shows a side view of package 30 in which single item 31 sits on backing 32. Thermoplastic film 33 extends over the entire top surface of backing 32 and is sealed thereto along seal line 34 which corresponds to the side edges of backing 32. The materials used and sealing methods employed are the same as those described previously

Regardless of where the thermoplastic film is sealed to the backing, the sealing technique employed preferably provides a seal with a seal strength of at least about 1500 g/25 mm, preferably at least about 2000 g/25 mm.

The thermoplastic film is mono- or bi-axially oriented and heat shrinkable. As used herein the term "mono- or bi-axially oriented, heat-shrinkable film"

identifies a film that has been mono- or bi-axially oriented by stretching at a temperature higher than the highest glass transition temperature (T_g) of the resins which make up the film and lower than the highest melting point of at least one polymer of the film, i.e., at a temperature where at least some of the resins from which the film is made are not in the molten state.

Mono- or bi-axially oriented heat-shrinkable films are made by (co)extruding polymeric resins from a melt into a thick film, followed by quickly quenching (to prevent or delay crystallization) and then orienting the thick film by stretching it, either monoaxially or biaxially, under temperature conditions where molecular orientation occurs yet the film does not tear. Upon subsequent re-heating at a temperature close to the orientation temperature, an oriented heat-shrinkable film tends to shrink in seeking to recover its original dimensional state. When a bi-axially oriented heat-shrinkable film is desired, it can be obtained by (co)extruding the polymer resin(s) through a round die, yielding a thick, tubular film that is immediately and quickly quenched, typically to about room temperature, by means of a water bath or cascade. This tubular film then is heated to the orientation temperature (which generally depends on the type of polymer resins employed and is, in any case, lower than the melting temperature of at least one polymer used) and stretched biaxially by, for example, the so-called "trapped bubble" technique where internal gas pressure expands the tube to form a large bubble and the expanded tube is advanced at a rate which is greater than the extrusion rate so as to obtain orientation in both the transverse direction (TD) and the longitudinal direction (LD). Typically, the stretch achieved by such a technique is at least about 3× in each direction. The film then is cooled so as to retain the property of heat shrinkability.

Alternatively, mono- or bi-axially oriented heat-shrinkable films can be obtained by extruding the polymer resin(s) through a flat die in the form of a sheet and, after a quenching step, heating the sheet to its orientation temperature and stretching it. Orientation in the LD typically is obtained by running the sheet over at least two series of pull rolls wherein the second set runs at a higher speed than the first one. Orientation in the TD typically is accomplished by means of a tenter

frame where the edges of the sheet are grasped by clips carried by two continuous chains running on two tracks that move progressively wider apart. (Where biaxial orientation is desired, stretching can be done in both directions simultaneously as opposed to sequentially, i.e., either longitudinally and then transversely or vice-versa.. The oriented film then is cooled and processed in the normal fashion. The stretch achieved by this type of technique typically is at least about 3× in each direction as well, although higher ratios are not uncommon.

As used herein, the term "heat-shrinkable" is used to describe those films which exhibit a percent free shrink of at least 15% in at least one direction when heated and unrestrained at a temperature of 120°C for 4 seconds in accordance to ASTM D 2732, as set forth in the 1990 Annual Book of ASTM Standards, vol. 08.02, pp. 368-71. Thermoplastic films used in the package of the present invention preferably exhibit a free shrink of at least 25%, more preferably at least 35%, in at least one direction.

The thermoplastic film used in the package of the present invention is mono- or bi-axially oriented and heat-shrinkable. When subjected to heat treatment, the film shrinks. The heat releases a force (so-called "shrink force" and, when referring to the sample cross-section, "shrink tension") that is useful to overcome the frictional forces between the packaged item(s) and the thermoplastic film and to tension the film, thereby avoiding wrinkles and creases on the package and at the same time keeping the items tightly in place on the backing even when the package is hung.

Films with a shrink tension of from about 2 to about 50 kg/cm^2 can be employed beneficially in the package of the present invention; preferred films are those with a shrink tension of from about 5 to about 40 kg/cm^2, and most preferred are those with a shrink tension of from about 8 to about 35 kg/cm^2. (Low shrink tension, for the purposes of the present invention, refers to a shrink tension below about 15 kg/cm^2.) In monoaxially oriented films, shrink tension develops only in the direction of the orientation. In biaxially oriented films, shrink tension develops, upon heating, in both the LD and TD.

The thermoplastic film used in the package of the present invention can have a low, medium, or high shrink tension depending on the type of product to be packaged and the type of backing used. For example, where a rigid and thick backing is used for packaging a non-deformable product, a medium-high shrink tension film preferably is employed. Alternatively, where a semi-rigid, deformable backing is used to package a soft product, a low shrink tension film preferably is used so as to avoid bending of the backing or deformation of the packaged product.

As indicated previously, shrink tension is the shrink force referred to the sample cross-section and is calculated by simply dividing the shrink force by the thickness of the film. Presently, no test method for measuring shrink force is recognized as a standard. The method used herein to measure this attribute involves cutting a specimen of a test film (2.54 cm x 14.0 cm); clamping the specimen between two jaws, one of which is connected to a load cell, so as to keep the specimen in the center of a channel into which an impeller blows heated air which increases the temperature therein at a rate of 2°C/sec; measuring the temperature of the channel (with, for example, three thermocouples) as well as the signal supplied by the load cell (in g); supplying the signals of the temperature and load signals to a recorder; and recording the temperature signal n the X axis and the load signal on the Y axis. As the temperature increases, the X/Y recorder displays the profile of shrink force versus temperature in the form of a curve that shows a gradual increase of the shrink force with temperature passing through a maximum at a temperature close to the orientation temperature. By dividing the specimen width (in cm) into the values thus recorded (multiplied by 10^{-3}), shrink force values (in kg/cm) are obtained; by further dividing the shrink force values by the specimen thickness (in cm), shrink tension data (in kg/cm^2) are obtained. As used herein "shrink tension" refers to the maximum value thus obtained over the entire temperature range tested.

The thickness of the thermoplastic film used in the package of the present invention can depend on the shape, weight, and/or rigidity of the item(s) to be packaged. Mechanical properties of oriented, heat shrinkable films generally

increase with increasing thickness. Therefore, a thicker film is preferred for packaging items with protruding edges or irregular shapes. Thicker films also can prove beneficial in the packaging of heavy and/or thick items, particularly where the package is to be hung. For relatively light and regularly shaped items, such as most stationery articles currently sold in blister packages, films from about 8 to about 35 μm thick can satisfactorily be employed; in more demanding applications, films as thick as 50 μm or even more can be usec. In general, however, films of from 8 to 15 μm suitably can be employed for light products with a regular shape, while films from 15 to 35 μm are satisfactory for heavy and/or irregularly shaped products. (Unlike skin packaging, in the packaging process according to the present invention, the thermoplastic film does not reduce its thickness but, on the contrary, can become slightly thicker depending on the amount of shrink.) The ordinarily skilled artisan can determine without undue burden the optimum thickness range for a given thermoplastic film and a given article to be packaged.

Generally, the thermoplastic film need not possess oxygen barrier properties. Suitable films include mono- or multi-layer polyolefin films that include one or more of ethylene homo-, co-, or ter-polymers and propylene homo-, co-, or ter-polymers. Examples of such polymers include, but are not limited to, polyethylene, ethylene/α-olefin co- and ter-polymers, ethylene/vinyl acetate copolymers, ethylene/alkyl (meth)acrylate copolymers, ethylene/(meth)acrylic acid copolymers, ionomers, polypropylene, propylene/ethylene copolymers, propylene/ethylene/butene terpolymers, anhydride grafted polyethylene, anhydride grafted ethylene/α-olefin co-and ter-polymers, anhydride grafted ethylene/vinyl acetate copolymers, and the like.

Regardless of the foregoing, blister-type packages with oxygen barrier properties can be useful in packaging food or other items which are sensitive to oxygen. When oxygen barrier properties are desired, the thermoplastic film can include one or more layers that include oxygen barrier resins such as, for example, vinylidene chloride copolymers; ethylene/vinyl alcohol copolymers; polyvinyl alcohol; or, where moderate oxygen barrier properties are sufficient,

(co)polyamides. Where a film with oxygen barrier properties is employed as the thermoplastic film, the backing also preferably is coated with an oxygen barrier layer (e.g., aluminum foil, an oxygen barrier film, or the like). In such a case, the venting hole(s) can be closed with, for example, oxygen barrier adhesive labels immediately after the shrinking step.

In the manufacture of a package according to the present invention, the backing typically is prepared in its finished form (including holes/slits, printing, coating, etc.) and placed horizontally on a conveyor. The item(s) to be packaged then are positioned over the backing. (When the thermoplastic film is not perforated, closing all potential venting holes in the backing (for example, by covering them with the item(s) to be packaged) is not preferred.) An oriented film then is placed over the item(s) and sealed to the backing along a closed line external to the item(s). Sealing can be accomplished by any of the methods discussed previously or by other methods that are substantially equivalent. Once sealed, the package is heat treated to shrink the thermoplastic film. The heat treatment can occur either during or subsequent to the sealing cycle. Heat treatment can be accomplished by, for example, passing the package through a hot air shrink tunnel. Upon heating, the thermoplastic film shrinks until it is restrained from further shrinking by the packaged product. Therefore, the thermoplastic film is tensioned over the product. Excess film, if any, then can be trimmed from the package.

Objects and advantages of this invention are further illustrated by the following examples. The particular materials and amounts thereof, as well as other conditions and details, recited in these examples should not be used to unduly limit this invention.

EXAMPLE

A brush (200 mm long, 60 mm wide, and 20 mm thick) weighing 200 g was positioned on a polyethylene-coated paperboard (2 mm thick, 300 mm long and 100 mm wide). A 3-layer irradiated film (15 μm thick) with a core layer of LLDPE and two outer layers made from a blend of LLDPE, LMDPE, and EVA

was prepared as described in Embodiment II of U.S. Patent No. 4,551,380 and had the following shrink properties:

	free shrink (at 120°C)	shrink tension (kg/cm^2)
LD	65%	26
TD	64%	35

The film was sealed to the backing by means of an impulse system (0.5 sec sealing time, 3×10^5 Pa sealing pressure, 12 mA impulse power) using a rectangular sealing frame (with an outer perimeter of 300 mm × 100 mm wide). Excess film was cut by a series of knives contouring the sealing frame was removed.

The sealed package was passed through a hot air tunnel set at 140°C. The final package had a very nice appearance and could be hung from a standard display rack. The amount of thermoplastic material used in the film used was nearly one-tenth of the amount of plastic material used for a conventional thermoformed front blister.

Various modifications and alterations that do not depart from the scope and spirit of this invention will become apparent to those skilled in the art. This invention is not to be unduly limited to the illustrative embodiments set forth herein.

CLAIMS

We claim:

1. A blister-type package comprising:
   a) a backing;
   b) at least one product disposed on said backing; and
   c) a thermoplastic film covering said at least one product and sealed to said backing along a line external to and spaced from said at least one product, said film being mono- or bi-axially oriented when applied to said backing and, after application to said backing, being heat shrunk so as to be tensioned over said at least one product and secure said at least one product to said backing.

2. The blister-type package of claim 1 wherein said thermoplastic film is bi-axially oriented.

3. The blister-type package of claim 1 wherein said backing is a rigid paperboard, optionally coated with a layer of heat-sealable polymer.

4. The blister-type package of claim 3 wherein said thermoplastic film is bi-axially oriented.

5. The blister-type package of claim 1 wherein at least one of said backing and said thermoplastic film comprises one or more venting holes.

6. The blister-type package of claim 1 wherein said backing comprises at least one portion that defines a shaped hole for hanging.

7. The blister-type package of claim 1 wherein said thermoplastic film comprises a polyolefin layer.

8. The blister-type package of claim 1 wherein said backing is substantially planar.

9. The blister-type package of claim 1 wherein said thermoplastic film, when heated at a temperature of 120°C for 4 seconds, has a free shrink of at least 25% in at least one direction.

10. The blister-type package of claim 9 wherein said thermoplastic film, when heated at a temperature of 120°C for 4 seconds, has a free shrink of at least 35% in at least one direction.

11. The blister-type package of claim 1 wherein said thermoplastic film has a thickness of from about 8 to about 50 mm.

12. The blister-type package of claim 1 wherein said thermoplastic film is adhesively sealed to said backing.

13. The blister-type package of claim 1 wherein said thermoplastic film is heat sealed to said backing.

14. A method of packaging one or more items in a blister-type package comprising:

a) loading at least one item on a backing;

b) along a line external to and spaced from said at least one item, sealing a mono- or bi-axially oriented thermoplastic film to said backing so as to form a package precursor; and

c) heating said package precursor so as to shrink said thermoplastic film to at least a point where said thermoplastic film is tensioned over said at least one item and holds said at least one item to said backing so as to form a blister-type package.

15. The method of claim 14 wherein said thermoplastic film comprises a polyolefin layer.

16. The method of claim 14 wherein said thermoplastic film, when heated at a temperature of 120°C for 4 seconds, has a free shrink of at least 25% in at least one direction.

17. The method of claim 16 wherein said thermoplastic film, when heated at a temperature of 120°C for 4 seconds, has a free shrink of at least 35% in at least one direction.

18. The method of claim 14 wherein said thermoplastic film has a thickness of from about 8 to about 50 mm.

19. The method of claim 14 wherein the sealing of said thermoplastic film to said backing is by application of an adhesive or by application of heat so as to form a heat seal.

20. The method of claim 14 wherein said backing is substantially planar.

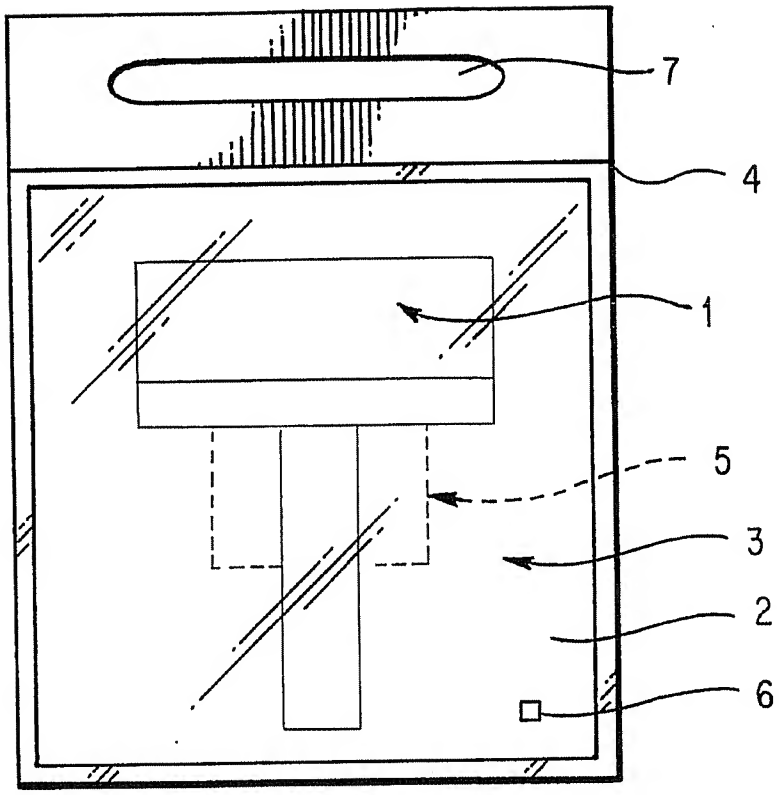

FIG. 1

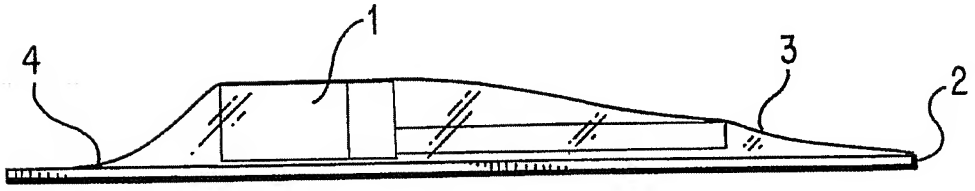

FIG. 2

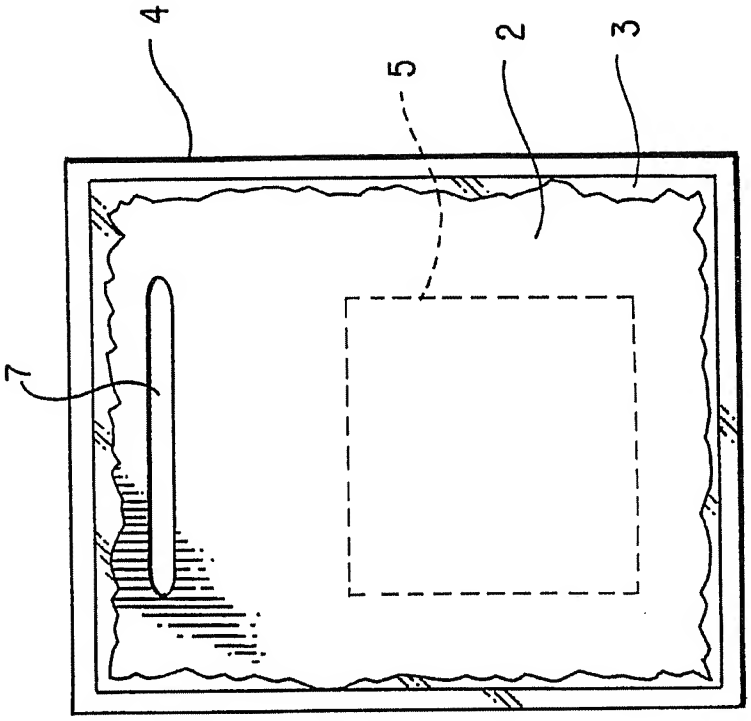

FIG. 4

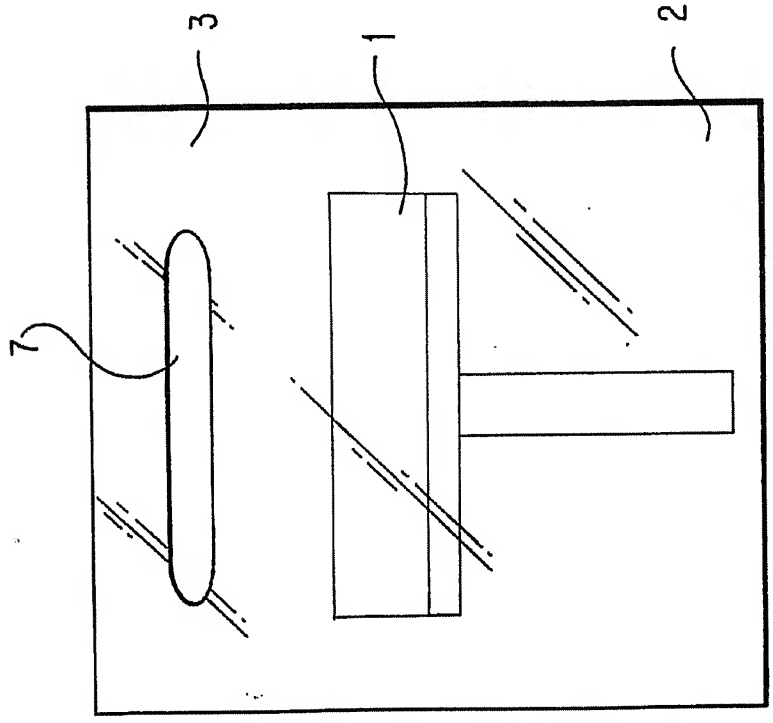

FIG. 3

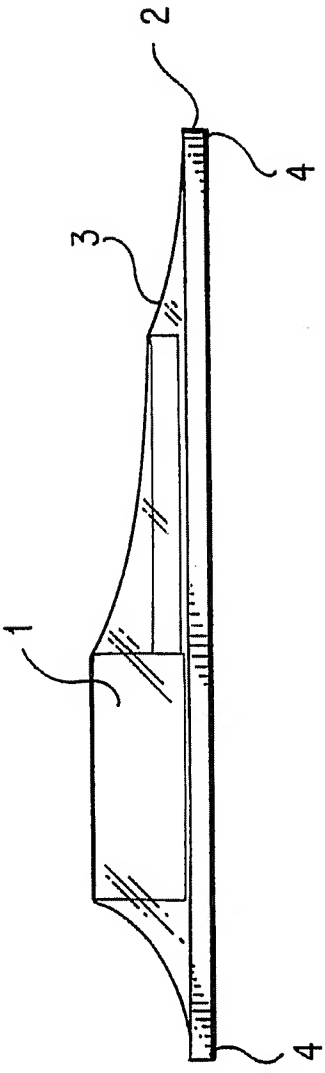

FIG. 5

INTERNATIONAL SEARCH REPORT

Ir ational Application No
PCT/US 98/00991

A. CLASSIFICATION OF SUBJECT MATTER
IPC 6 B65D75/30

According to International Patent Classification(IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
IPC 6 B65D

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category °	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	GB 2 206 890 A (GRACE W R & CO) 18 January 1989 see page 1, paragraph 1 - paragraph 2 see page 2, paragraph 2 - paragraph 3 see page 5, last paragraph see page 11, last paragraph - page 12, paragraph 1; claims 6,7; figures 1,2	1-5,7,8, 13
A		14,15, 19,20

X	WO 95 21105 A (AQUASOL LIMITED ;EDWARDS DAVID BRIAN (GB); MCCARTHY WILLIAM JOHN () 10 August 1995 see the whole document	1-4,6
A		5,19,20

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[X] Further documents are listed in the continuation of box C.

[X] Patent family members are listed in annex.

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1

Date of the actual completion of theinternational search	Date of mailing of the international search report
8 May 1998	18/05/1998

Name and mailing address of the ISA	Authorized officer
European Patent Office, P.B. 5818 Patentlaan 2 NL - 2280 HV Rijswijk Tel. (+31-70) 340-2040, Tx. 31 651 epo nl, Fax: (+31-70) 340-3016	Spettel, J

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INTERNATIONAL SEARCH REPORT

Int .tional Application No
PCT/US 98/00991

C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document, with indication.where appropriate. of the relevant passages	Relevant to claim No.
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